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Recommendations

Pine Species:

First Thinning: Remove every 4th row and thin in between the leftover rows to remove the forked, diseased, and crooked trees. Your target residual basal area is 70 ft2/acre. The goal of thinning is to leave the best formed, healthiest, and most vigorous trees to grow into a more valuable product, such as sawtimber and/or poles. Remove diseased, forked, suppressed or damaged trees. Thin out around edges of pine stands to make them more accessible and to improve the area needed for firebreaks. Also take out additional pines sporadically within perimeter edge to create small openings. These areas "soften" the edges, allow more early successional plant growth, and create small corridors of travel for wildlife. Be sure to have a logging contract in place before harvesting. Examples of logging contracts and other information on selling your timber can be found on our website at https://gatrees.org/forest-management-conservation/timber-sales-harvest-advice/.

Second Thinning: The increased growth response from a thinning typically lasts 6-8 years. The stand should be ready to be second thinned in 7 years from your first thin. However, have a GFC Forester or a Consultant Forester come to take preliminary samples to make sure the stand is ready to be thinned again. A second thinning will focus on leaving potential sawtimber and pole sized trees to allow them to increase in size while you remove the poorer formed trees with disease or forks. This also includes suppressed trees. Your target residual basal area is 60-70ft2/acre. It is highly recommended to use a consultant forester to mark the thinning before harvesting to make sure your best trees are left.

Final Harvest: The stand should be clearcut as soon as possible. Because of the size of the trees in the stand, you may consider having a consultant forester cruise the stand to be sure you receive bids that are close to the true value of the timber. The GFC has information on selling your timber and example timber sale contracts on our website at https://gatrees.org/forest-management-conservation/timber-sales-harvest-advice/. It is recommended to choose a logger who is a Master Timber Harvester (MTH) as they should have an understanding of BMPs.

Site Preparation options

Site Preparation: Site prep and replant this stand in Slash or Loblolly Pine. In the summer root rake any logging debris into piles and then roller chop the stand. The roller chopping will break up the root mats of the gallberry and saw palmetto. Sometime from July to September, perform a broadcast application with 32-48 ounces of Chopper or another imazapyr product with 2-4 quarts of Garlon 4 or another triclopyr in ester formulation product, 1 0z. of Escort XP or anther metsulfuron methyl product, and 15-20 gallons of water per treated acre. This will help control competing vegetation that might re-

sprout after the mechanical treatments. Consider contacting an herbicide product representative for herbicide application rates and recommendations. Be sure to read and follow the herbicide label in its entirety. Do not apply herbicides to areas with surface water present. Plan and execute chemical treatments on days with little to no wind and no precipitation predicted within a 48 hour post spray period. Wait a minimum of 8-10 weeks before planting. Refer to the herbicide label for additional information. Planting directly after a site prep herbicide application can result in pine seedling mortality. 3-4 weeks after spraying, burn the site and piles (if you have them). When you burn be sure to consider potential smoke and fire management problems (piles may continue to burn and smolder for weeks/months). Frequently stirring or pushing will help encourage a complete burn. On the day of the burn, be sure to obtain a burning permit from the Georgia Forestry Commission (GFC). In October, Bed previous planted areas on 12 foot centers to establish a sound planting medium for the trees and to get their roots above the water table. You will need to wait 3-4 weeks or an inch of rain before planting to allow the beds to settle. Air pockets in the beds will kill roots.

Site Preparation: Site prep and replant this stand in either Slash or Longleaf Pine. In the summer root rake any logging debris into piles and then roller chop the stand. The roller chopping will break up the root mats of the gallberry and saw palmetto. Limit any soil movement as the majority of the nutrients are located in the top few inches of soil. Losing those nutrients will result in stunted trees. Sometime from July to September, perform a broadcast application with 32-48 ounces of Chopper or another imazapyr product with 2-4 quarts of Garlon 4 or another triclopyr in ester formulation product, 3-4 ounces of Oust Extra (or another sulfometuron methyl mixed with metsulfuron methyl product), and 15-20 gallons of water per treated acre. This will help control competing vegetation that might re-sprout after the mechanical treatments. Consider contacting an herbicide product representative for herbicide application rates and recommendations. Be sure to read and follow the herbicide label in its entirety. Do not apply herbicides to areas with surface water present. Plan and execute chemical treatments on days with little to no wind and no precipitation predicted within a 48 hour post spray period. Wait a minimum of 8-10 weeks before planting. Refer to the herbicide label for additional information. Planting directly after a site prep herbicide application can result in pine seedling mortality. 3-4 weeks after spraying, burn the site and piles (if you have them). When you burn be sure to consider potential smoke and fire management problems (piles may continue to burn and smolder for weeks/months). Frequently stirring or pushing will help encourage a complete burn. On the day of the burn, be sure to obtain a burning permit from the Georgia Forestry Commission (GFC).

Site Prep: Site prep and replant this stand in Longleaf. In the summer, roller chop the stand to break down any vegetation. In the area with slope, roller chop up and down the slope so the blades on the roller chopper will make divots parallel to the slope. Sometime from July to September, perform a broadcast application with 32-48 ounces of Chopper or another imazapyr product with 3-4 ounces of

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Oust Extra (or another sulfometuron methyl mixed with metsulfuron methyl product) and 15-20 gallons of water per treated acre. This will help control competing vegetation that might re-sprout after the mechanical treatments. Consider contacting an herbicide product representative for herbicide application rates and recommendations. Be sure to read and follow the herbicide label in its entirety. Do not apply herbicides to areas with surface water present. Plan and execute chemical treatments on days with little to no wind and no precipitation predicted within a 48 hour post spray period. Wait a minimum of 8-10 weeks before planting. Refer to the herbicide label for additional information. Planting directly after a site prep herbicide application can result in pine seedling mortality. 3-4 weeks after spraying, burn the site and piles (if you have them). When you burn be sure to consider potential smoke and fire management problems (piles may continue to burn and smolder for weeks/months). Frequently stirring or pushing will help encourage a complete burn. On the day of the burn, be sure to obtain a burning permit from the Georgia Forestry Commission (GFC).

Site Prep: Site prep and replant this stand in longleaf pine. Root rake the debris and burn the piles. When you burn be sure to consider potential smoke and fire management problems (piles may continue to burn and smolder for weeks/months). Frequently stirring or pushing will help encourage a complete burn. On the day of the burn, be sure to obtain a burning permit from the Georgia Forestry Commission (GFC). Sometime from April to June (preferably once you get full leaf expansion), perform a broadcast application with 128-196 ounces (4-6 qts) of Velpar L or another hexazinone product with 2-4.25 ounces of Oust XP or another sulfometuron methyl product and at least 25 gallons of water per treated acre. If blackberry may be an issue, consider replacing Oust XP with 3-4 ounces per acre of Oust Extra (or another sulfometuron methyl mixed with metsulfuron methyl product). This will help control competing vegetation that might re-sprout after the mechanical treatments but will keep much of your native warm season grasses. Consider contacting an herbicide product representative for herbicide application rates and recommendations. Be sure to read and follow the herbicide label in its entirety. Do not apply herbicides to areas with surface water present. Plan and execute chemical treatments on days with little to no wind and no precipitation predicted within a 48 hour post spray period. Refer to the herbicide label for additional information. Planting directly after a site prep herbicide application can result in pine seedling mortality.

Reforestation: Site prep and replant this stand in Slash Pine or Loblolly Pine. Chop and burn the area and follow-up with mechanically planting Slash or Loblolly Pine in the between November and February. Install and maintain firebreaks around this area to protect against wildfires. Consider doing light winter disking between tree rows to stimulate the herbaceous understory; be careful not to damage tree's shallow feeder roots. Rotational light disking between rows over the first 3-4 years is actually better for wildlife than mowing. A general recommendation is 2.5% of the property should consist of wildlife openings. Consider creating 1 to 3 acre wildlife openings at time of site prep. Apply

chemical site preparation treatment in early fall before planting. This will help control undesirable vegetative competition. Competition control is crucial for successful tree establishment (especially during the first 3 growing seasons). Waxy-leaved and hardwood species should be suppressed and/or controlled before establishing Longleaf Pine. The chemical of choice will depend on the type of vegetation which re-sprouts over the area. However, herbicides containing imazapyr, glyphosate, triclopyr are commonly used in forestry site preparation activities. Read and follow the herbicide label and associated materials.

Scalping: From September to November scalp the stand to peel back the grass to remove any grass from where the longleaf will be planted. Rows need to be 12' apart and each scalp needs to be 3-4 inches deep and 30 inches wide. Be sure to scalp along the contours to prevent erosion.

Subsoiling: From September to November immediately after scalping, Subsoil in the middle of the scalps. Subsoil depth needs to be 14-20" deep to break up the compacted soil layer. At least an inch of rain will be required to settle the subsoiling before planting. Planting without allowing the subsoils to settle can cause seedling mortality if roots come into contact with air pockets.

Planting Options

Planting: Use a machine planter to plant bareroot or containerized Slash or Loblolly Pine in the winter between November and February using a spacing of 6' x 12' which results in 605 trees per acre. Planting closer than this will cause the trees to get too dense too quickly before thinning age and the live crown ratios will suffer. If planting Loblolly Pine, spacings ranging from 6' x 12' (605 tpa) to 6' x 10' or 5' x 12" (726 tpa) will suffice.

Planting: Hand plant containerized Longleaf Pine, Loblolly Pine, or Slash Pine in the winter between November and February using a spacing of 5' x 12' or 6' x 10', both of which results in 726 trees per acre for longleaf pine. Use spacing of 6' x 12' which results in 605 trees per acre for slash pine. Proper planting depth is crucial for successful Longleaf Pine establishment. Seedling survival and growth are negatively affected by "deep planting". Seedling mortality will increase if the bud is covered with soil at time of planting. I recommend positioning the bud approximately 2 inches above the soil surface, leaving 1.5 inches of the plug exposed above soil surface. Be aware that you will need to order your seedlings the previous June-July to reserve your share.

Planting: Use a hand planter to plant containerized Longleaf Pine in the winter between November and February using a spacing of 6' x 10' which results in 726 trees per acre for longleaf pine. Proper planting depth is crucial for successful Longleaf Pine establishment. Seedling survival and growth

are negatively affected by “deep planting”. Seedling mortality will increase if the bud is covered with soil at time of planting. I recommend positioning the bud approximately 2 inches above the soil surface, leaving 1.5 inches of the plug exposed above soil surface. Be aware that you will need to order your seedlings the previous June-July to reserve your share. Install and maintain firebreaks around this area to protect against wildfires. Consider doing light winter disking between tree rows to stimulate the herbaceous understory; be careful not to damage tree’s shallow feeder roots. Rotational light disking between rows over the first 3-4 years is actually better for wildlife than mowing. A general recommendation is 2.5% of the property should consist of wildlife openings. Consider creating 1 to 3 acre wildlife openings at time of site prep.

Competition Control Options

Herbaceous Weed Control: From late March to April after planting, perform a herbaceous weed control using a banded spray (4 feet wide) of a mixture of 24 ounces of Velpar L and 2 ounces of Oust per treated acre to combat competing vegetation. Oustar at a rate of 10 -12 ounces per treated acre may be substituted for the above. This will help control herbaceous weed and grasses that emerge after planting. Specific herbicide rates depend on the relative pH of the soil. Do not apply Oust when soil pH is greater than 6.2. Read and follow the herbicide label and associated materials in reference to pH. Avoid spraying in times of drought! Remember a band spray only covers a span of ~ 4 feet (one- third of the total acreage). Be sure to read and follow the herbicide label in its entirety. Be sure to follow Georgia’s Best Management Practices (BMP’s) for forestry while applying herbicides.

Competition Control: Utilize a combination of mechanical and chemical vegetation control techniques to control competing vegetation, especially hardwood oak. Mowing will also benefit various wildlife species such as white-tailed deer, wild turkey, and other non-game wildlife species (mowing should never be performed during nesting season). Chemical treatments can be made once tree heights are high enough to apply ground sprays without coming in contact with pine foliage. Common herbicides used underneath tree canopies include glyphosate, triclopyr, and metsulfuron methyl. Avoid using products that contain imazapyr because the potential for root uptake and subsequent tree damage. Vegetation control throughout the rotation will help facilitate pine straw harvest operations and increase tree growth.

a. Longleaf pine is a shade intolerant tree and when be stunted when under shady conditions; longleaf requires direct sunlight to promote growth. Towards the front of the property with longleaf within the grass stage and large, mature mast producing oaks, consider creating and/or promoting wildlife habitat. To promote longleaf a viable longleaf stand out of the grass stage, reduce hardwood competition and shade to allow direct sunlight to reach trees. Utilize chemical competition control on

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shruby competition and with backpacks hack-and-squirt for mature trees. A prescribe burn should be done in early winter to reduce dead debris and promote longleaf out of the grass stage as well as reduce understory competition in taller trees

Firebreaks and Burning

Installation of Firebreaks: Protect your investment from the damaging effects of wildfire by installing/maintain firebreaks. The GFC offers fire break plowing, harrowing and burning assistance for a nominal fee; for more information about our services, to obtain a burning permit, or prescribe a burning plan call (local gfc number).

Prescribed Burning: IF YOU PLANT LONGLEAF PINE I recommend prescribe burning this area as soon as enough vegetation is present to carry a fire (within 1-3 years after planting while trees are still in the grass stage). Plan and execute prescribe burns when temperatures are below 55° F. A second prescribe burn should be conducted in the 6th growing season. Prior to prescribe burning this stand make sure fire breaks are established around the perimeter and within the interior (when needed). On the day of the burn, be sure to obtain a burning permit from the Georgia Forestry Commission (GFC). The GFC offers fire break plowing, harrowing and burning assistance for a nominal fee; for more information about our services, to obtain a burning permit, or prescribe a burning plan call (local GFC number).

Installation of firebreaks and prescribed burning: I recommend prescribe burning this area a year after you thin in the winter December-March. Following that, I recommend continuing to burn on a 2-3 year rotation. Do not burn within 5 years of your next thinning or final harvest as char marks on your timber could lead to a reduced price from the mill. Prescribed Burning will greatly reduce fuel loading and mitigate the risk of wildfires. You may want to break the stand up into blocks and burn each block every other year. Plan and execute prescribe burns when temperatures are below 55° F. Be sure to obtain and file a burning permit along with a prescribe burn plan from the Georgia Forestry Commission (GFC) before burning. The GFC offers firebreak plowing services and prescribe burning assistance.

Prescribed Burning: I recommend prescribe burning this area a year after you thin in the winter November-February. Following that, I recommend continuing to burn on a 2-3 year rotation. Do not burn within 5 years of your final harvest as char marks on your timber could lead to a reduced price from the mill. Prescribed Burning will greatly reduce fuel loading and mitigate the risk of wildfires. You may want to break the stand up into blocks and burn each block every other year. Plan and execute prescribe burns when temperatures are below 55° F. Be sure to obtain and file a burning permit along with a prescribe burn plan from the Georgia Forestry Commission (GFC) before burning. The GFC offers firebreak plowing services and prescribe burning assistance (local gfc office).

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Pinestraw Management

Pinestraw Raking: Around age 10, the stand should reach crown closure which will allow for the stand to be raked. Contact a pine straw producer at this point to get bids on raking pinestraw. Ensure raking only occurs once per year to limit moisture stress to the trees. Also be sure raking doesn't occur to bare soil as this will allow the moisture to evaporate at a much higher rate. Depending on your contract, you may be required to continue competition control in the stand.

Pine Straw Production: Continue to rake the stand for pine straw every year. Only rake once per year to limit moisture stress to the trees. Ensure chemical and/or mechanical competition is controlled depending on if it is included in your contract.

Hardwood Establishment Options

(Wetland) Hardwood Establishment: To establish hardwoods through artificial regeneration, prescribed burning will likely be the best first step. This will help to remove competing vegetation and debris. The burn will also help to improve stem quality on stump sprouts by killing off the sprouts coming from above ground and forcing the tree to send sprouts from below ground (sprouts coming from below ground typically have better stem form). It is best to do this burn in the summer or early fall. Be sure to obtain a burn permit the day of the burn by contacting your local GFC Unit. If you DO NOT wish to have natural regeneration, 4-6 weeks after burning, apply herbicides over the site to control competing vegetation. Some commonly used imazapyr products such as chopper are labeled for aquatic use and will do well to control competing vegetation on your site. In the winter, plant a mixture of hardwood seedlings at a spacing of 10' x 10' resulting in 436 trees per acre for a timber objective. When planting hardwoods, it is typically best to plant multiple species rather than only one as in pine plantations. Diversity will improve stand structure and growth and the resiliency of the stand from flooding and insects and disease. Blackgum, cypress, eastern cottonwood, swamp chestnut oak, and overcup oak among others should do well on your site. If you plant cypress, a spacing of 8' x 8' resulting in 680 trees per acre is common for timber production objectives.

All other hardwood establishment

Site Prep: Root rake debris in piles and burn along with the site. Be sure to obtain a burn permit the day of the burn by contacting your local GFC Unit. Apply Chopper at a rate no higher than 32 oz/acre in August of 2017. Be sure to not apply more than 32 oz/acre and no later than the end of August as

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Chopper can be very harmful to hardwoods seedlings. In areas where you will be planting yellow poplar (Liriodendron tulipifera), you can also apply 2 ounces of Escort per acre to further control briars and muscadine. As always, follow the label when applying herbicides.

Optional Small Grain Cover Crop: If you believe deer predation may be a serious issue, in mid-fall, plant winter wheat (Triticum aestivum) at a rate of 2 bushels (150 lbs) per acre. This can be accomplished either with or without disking and fertilization is not required. If you begin to have an extreme drought once the trees are planted, you may need to apply a grass herbicide to remove the grass from around the tree. This can be accomplished by spot spraying Glyphosate at a 4-7 percent solution. Be sure to not get any solution on the leaves of your hardwood seedlings.

Planting: From December to February, plant your hardwood seedlings in the grass or in tree tubes (if deer predation may be risk) at a density of at most 605 trees per acre (6'x12') down to 436 trees per acre (10' X 10'). The exact spacing will depend on your objectives and the tree species. In general, timber oriented plantings should have a greater density than wildlife oriented plantings. As for the species to plant, please see the table below.

Mast Producing Hardwoods (Wildlife)

Moderately Well Drained to	Somewhat Poorly Drained	Poorly Drained
Live Oak, Quercus virginiana	Overcup Oak, Quercus lyrata	
Persimmon, Diospyros virginiana	Sugarberry, Celtis Laevigata	
Red Mulberry, Morus rubra	Green Ash, Fraxinus pennsylvanicum	
Chickasaw Plum, Prunus angustifolia	Elderberry, Sambucus canadensis	
Swamp Chestnut Oak, Quercus michauxii	Temporarily Flooded	
Yellow Poplar, Liriodendron tulipifera	Water Hickory, Carya aquatica	
Southern Catalpa, Catalpa bignonioides	Water Tupelo, Nyssa aquatica	
American Elm, Ulmus americana	Fevertree, Pinckneya bracteata	

Timber Species of Hardwoods

Moderately Well Drained to	Somewhat Poorly Drained	Poorly Drained

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Yellow Poplar, Liriodendron tulipifera Laurel Oak, Quercus laurifolia

Swamp Chestnut Oak, Quercus michauxii Sugarberry, Celtis Laevigata

Cherrybark Oak, Quercus pagoda Green Ash, Fraxinus pennsylvanicum

Overcup Oak, Quercus lyrata River Birch, Betula nigra

Southern Red Oak, Quercus falcata Eastern Cottonwood, Populus deltoides

American Sycamore, Platanus occidentalis Temporarily Flooded

Blackgum, Nyssa sylvatica Water Hickory, Carya aquatica

Black Cherry, Prunus serotina Water Tupelo, Nyssa aquatica

White Oak, Quercus alba Sweetbay, Magnolia virginiana

Pignut Hickory, Carya glabra Bald Cypress, Taxodium distichum (Flowing water)

Sweetgum, Liquidambar styraciflua Pond Cypress, Taxodium ascendens (flat ponds)

Cypress Reforestation: The best time to plant a bareroot cypress seedling is from November to March when the seedlings are dormant. You want to make sure that the seedlings are not exposed to drought so plant when the soil is moist or shallowly flooded and will likely remain that way for several months. It is recommended to plant cypress at a spacing of 8' x 8' resulting in 680 trees per acre when timber production is the objective. Lower densities can satisfy other objectives such as wildlife management. Plant the seedlings by hand rather than with machine planters to prevent soil disturbance in a wetland.

Hardwood Management Options

Thinning: Select thin this hardwood area to a basal area of 60ft^2/acre using the selection method (operator or marked). Start by removing undesired species such as sweetgum, beech, poplar, etc and leaving desired species such as hard mast producing like oaks and hickories. Be sure to use a consulting forester for all timber sales.

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Shelterwood: Harvest all merchantable trees but approximately 30ft²/acre or 3-5 trees per acre leaving the most desired species spread out. This will open up the understory and all the smaller or unmechantable trees to get sunlight and more nutrients to grow into the next overstory canopy.

Leave undisturbed:

This Area Should Be Left Undisturbed: Natural isolated depressions and ephemeral drainage ways provide a unique wildlife habitat, increase tract diversity, and enhance aesthetics. Many species of wildlife can use these areas for a source of water, cover, and/or travel corridor. Drainage ways and depressions also service as "nutrient sinks" and are vital in maintaining water and air quality (filtering and reduction of atmospheric carbon). If harvest operations are to ever occur in these areas follow all of the best management practices (BMP's) for this area. The BMP's say a 40 foot Streamside Management Zone (SMZ) is the minimal width on each side of the channel for a perennial stream and a 20 foot SMZ for an intermittent stream with less than 20% slope. An SMZ is not a buffer and trees can be thinned out within as long as a certain density is retained and other BMPs are followed during the harvesting such as reducing rutting. 25 ft2 of basal area and 25% canopy cover must be maintained with in the 20 feet SMZ of and intermittent stream. 50 ft2 of basal area and 50% canopy cover must be maintained with in the 40 feet SMZ of a perennial stream. Stream bank trees should not be cut. These are only minimal guidelines to follow. Harvest operations should be conducted during dry periods to prevent excessive rutting. Although these areas may be prescribed burned, avoid high intensity fires and use caution because of increased smoke management risks, damage to thinned barked hardwoods, and equipment operability limitations. Other harvesting options to improve stand dynamics and wildlife habitat are to remove smaller, co-dominant tree species from the hardwood stand. Undesirable trees can be removed around selected dominant oak species to encourage growth, stimulate mast-production, and open up the understory to promote native grasses and forb production that is beneficial to wildlife. This can be achieved by mechanical removal, girdling with axe or chainsaw, or by a selective herbicide applications (Garlon or another triclopyr product) using a hack and squirt or basal bark method.

This area should be left undisturbed: Upland Hardwood areas provide a unique wildlife habitat, increase tract diversity, and enhance aesthetics. Many species of wildlife can use these areas for a source of cover and/or a travel corridor. Other harvesting options to improve stand dynamics and wildlife habitat are to remove smaller, co-dominant tree species from the hardwood stand. Undesirable trees can be removed around selected dominant oak species to encourage growth, stimulate mast-production, and open up the understory to promote native grasses and forb production that is beneficial to wildlife. This can be achieved by mechanical removal, girdling with axe or chainsaw, or by a selective herbicide (Garlon) using a hack and squirt method. Species to remove would be water oak and laurel oak as they are prolific in other areas of your property.

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This surrounding area should be left undisturbed: Many species of wildlife can use these areas for a source of water, cover, and/or travel corridor. Drainage ways also service as "nutrient sinks" and are vital in maintaining water and air quality (filtering and reduction of atmospheric carbon).

Invasive species

Invasive Species Control: Follow the recommendations below. Note that it may take more than one treatment to remove these invasive species. For more information on the identification and control of invasive species, refer to the US Forest Service management guide for Invasive Plants in Southern Forests for more information on the identification and control on invasive species: https://www.srs.fs.fed.us/pubs/gtr/gtr_srs131.pdf

a. Chinaberry, Melia azaderach: Be sure to only apply one of the treatments in an area. Do not overlap treatments. For trees, you can apply Arsenal AC (or another 2lb imazapyr herbicide) at a 20% solution with water using the hack and squirt method where one cut in the bark into the cambium layer is made for every 3 inches of stem diameter measured at breast height (4.5 feet) and spray 1 milliliter of solution into the cut. Do this treatment from August to March. For saplings you can apply a basal spray of Garlon 4 (or another triclopyr in ester formulation herbicide) as a 10 to 20 percent solution in a labeled basal oil product. Garlon 4 can volatize when temperatures exceed 85 degress Farenheit as this can damage nearby pines. Apply anytime when temperatures are below 85 degrees farenheit except from March to April.

b. Japanese Climbing Fern, Lygodium japonicum: Japanese Climbing Fern is an invasive species that can choke out native vegetation and create a dangerous fire hazard when prescribed burning because it will act as a fuel ladder carrying the flame up it and to the crowns of the trees. It spreads very easily through spores which are produced after September and until July. These spores are extremely tiny and can get caught on clothing and equipment causing further spread. Therefore, it is imperative that you treat the site between July to September. There are a few treatments for Japanese Climbing fern. Be sure to only apply one of the treatments in an area. Do not overlap treatments. Apply glyphosate at a 4% solution with a surfactant. Be sure to thoroughly wet all leaves. Gylphosate at 4% mixed with Escort XP (or another metsulfuron methyl herbicide) at 1 to 2 ounces per acre in water can be applied if the stand is not longleaf. If non-target damage is not a concern, apply a 1% solution of Arsenal (or another 2lb imazapyr herbicide) mixed with Glyphosate at 4%. These treatments should be done from July to September before spore release. Be sure to follow label when applying any herbicide. This first treatment will likely not kill all of the ferns and a second treatment may be needed next July to September to completely kill it.

c. Chinese Privet, Ligustrum sinense: Be sure to only apply one of these treatments in an area. Do not overlap treatments. Apply glyphosate at a 3% solution with surfactant using a backpack mist blower and thoroughly wet all leaves of the plant. To ensure safety to surrounding hardwoods, apply this treatment in the winter. A summer treatment of glyphosate may not be as effective as other times and will require a higher percent solution. If protection of surrounding hardwoods is not desired, you may apply Arsenal AC (or another 2lb imazapyr herbicide) as a 1 percent solution or Escort XP (or another metsulfuron methyl herbicide) at 1 ounce per acre. Be aware that nontarget plants may be killed or injured by root uptake with the Arsenal AC or Escort XP treatments. The best time for the Arsenal AC or Escort XP treatment is from summer to fall. If stems are too tall for a complete coverage of a foliar spray and when safety to surrounding vegetation is desired, apply a basal spray of Garlon 4 (or another triclopyr in ester formulation herbicide) as a 20 percent solution in a labeled basal oil product. Garlon 4 can volatize when temperatures exceed 85 degress Fahrenheit as this can damage nearby pines. Apply anytime when temperatures are below 85 degrees Fahrenheit except from March to April. Be sure to follow the label when applying any herbicide.

d. Mimosa, Albizia julibrissin: Be sure to only apply one of these treatments in an area. Do not overlap treatments. For trees, if safety to surrounding vegetation is desired, make stem injections with Garlon 3A in dilution as specified by label. If you fell a tree, immediately apply ORTHO Brush-B-Gon, Enforcer Brush Killer, or Vine-X as an undiluted solution to the stump. For saplings, apply a basal spray to young bark using Garlon 4 as a 20% solution in a labeled basal oil product. You could also apply Pathfinder II undiluted. Stem injection treatments and basal spray treatments can be applied any time of year except March and April. For resprouts and seedlings, thoroughly wet all leaves with one of the following herbicides in water with a surfactant. Apply 1 oz per acre of Escort XP (0.2 ounces per 3 gallon mix) with a 2 percent mix with glyphosate (8 ounces per 3 gallon mix) from June to August or Milestone VM at 6-9 pints per acre (1.5 to 3 pints per 3-gallon mix and 10 gallons per acre) from June to August. From July to September, apply Transline (only controls plants in the Fabaceae family (legumes)) as a 0.25% solution (1 oz per 3 gallon mix) with Garlon 3A as a 4% solution (1 pint per 3 gallon mix). Be sure to follow the label when applying any herbicide.

e. Chinese Tallow Tree, Triadica sebifera: Chinese tallow tree is a prolific seeder which can produce over 100,000 seeds per tree per year. It can create dense monoculture stands that crowd out all other native species. I recommend applying Garlon 3A at a 50% solution with water using the hack and squirt method where one cut in the bark into the cambium layer is made for every 3 inches of stem diameter measured at breast height (4.5 feet) and spray 1 milliliter of solution into the cut. You could also use a stump treatment where immediately after felling the tree, apply a 20% solution of Garlon 3A (2 quarts per 3 gallon mix). Be sure to spray the stump completely because the last few years of growth are where active water and nutrient transport occur. Both of these treatments can be done any time of year except

from March to April. Always be sure to consult the label to make sure you are applying the herbicide in the correct situation and what PPE should be worn. For seedlings and saplings, thoroughly wet all leaves with one of the following herbicides in water with a surfactant from July to October. When safety to surrounding vegetation is not desired, apply Arsenal AC as a 0.75% solution (3 oounces per 3 gallon mix) or Clearcast as a 2% solution (8 ounces per 3 gallon mix) (Clearcast is safe to many hardwoods). If safety to surrounding vegetation is desired, apply Garlon 4 as a 2% solution (8 ounces per 3 gallon mix). Garlon 4 can volatize when temperatures exceed 85 degress Farenheit which can cause damage to nearby pines. Where there are heavy infestations and single stem treatments are not feasible, consider an aerial broadcast of 64 ounces of Clearcast with at least 20 gallons of water per treated acre over the tops of the trees in the late fall. Clearcast is a very selective herbicide which targets tallow tree while leaving other hardwoods and pines mostly unscathed. You may notice some leaf discoloration but it should not damage the other hardwoods significantly. It has little to no effects on pines. It should release other hardwoods and pines giving them more room to grow. Because this is herbicide has an aquatic use label, it can be applied in wetlands and to surface waters. However, avoid spraying and minimize drift into SMZs. Consider contacting an herbicide product representative for herbicide application rates and recommendations. Plan and execute chemical treatments on days with little to no wind and no precipitation predicted within a 48 hour post spray period.

f. Callery Pear, Pyrus calleryana: Thoroughly cover all leaves with glyphosate as a 2% solution or triclopyr as a 2% solution (8 ounces per 3 gallon mix) from August to October. For large trees, you could cut the tree down and immediately (within 5 minutes) paint the stump with a 2,4-D herbicide like ORTHO Brush-B-Gon, Enforcer Brush Killer, or Vine-X. It is more important to paint the outer inch of the stump rather than the middle. The reason for this is that the outer inch of the stump is where nutrient flow occurs so that is where the tree will translocate the herbicide to the roots. Prompt application after cutting the tree down is critical because the tree will cut off nutrient flow from those areas to protect itself from decay. A basal spray of Garlon 4 as a 20 percent solution in a labeled basal oil product can also be applied to larger stems.

g. Kudzu, Pueraria montana: The best application for control when safety to surrounding plants is desired is to apply Transline at a 0.5 percent solution (2 ounces per 3 gallon mix) by thoroughly wetting all leaves to as high as possible. To ensure safety to surrounding plants, try to only spray kudzu leaves. Transline is effective at killing most plant species in the Fabaceae family. When safety to surrounding plants is not desired, or when treating a large kudzu infestation, The following herbicides mixed in water with a surfactant will help to control the infestation but will likely need additional treatments:

h. Sand Pine, Pinus clausa: There are two options to control sand pine in your stand. Either use the Hack and Squirt method with full strength triclopyr where you make one cut in the stem and spray 1 ml

of herbicide into the cut or use the cut stump method with triclopyr or glyphosate where you cut the tree down and then immediately spray the stump with a 50% solution of herbicide. It is likely that sand pine will re sprout after either of these treatments. When controlling acres of sand pine at a time, consider applying 1-5 ounces of Detail or another saflufenacil product.

Wildlife options

Wildlife Hardwood Plantings: Plant hard and soft mast producing species along the outside edge to further increase forage opportunities for the openings. Some good hardwood species to plant are: chickasaw plum, swamp chestnut oak, red mulberry, white oak, and overcup oak. If planting bareroot seedlings, you may need to use tree tubes to help with competition control and prevent predation.

Food Plot Maintenance: Maintenance will need to occur every year. Refer to page 105 in the appendix for food recommendations.

Firewise

Firewise: Keep home site clean of debris and maintain landscape to reduce any possible fire impacts. Clear leaves and other debris from gutters, eaves, porches and/or decks to prevent embers from igniting the home. Remove dead vegetation within 10 feet of the house. Remove flammable materials (firewood stacks, propane tanks, dry vegetation) within 30 feet of the home's foundation and outbuildings. Prune tree branches near the home to 6 – 10 feet from the ground. Keep lawns hydrated and maintained, dry grass and shrubs are fuel for wildfires. Having a metal roof is an excellent step to making your home Firewise. Refer to www.firewise.org for more information.

Pond Management

General Pond Management: Typical pond management include aspects to enhance food availability for fish, controlled harvesting to maintain a sustainable predator/prey population, aquatic vegetation control, and reducing probability for fish kills. Water quality is one of the most important factors for sustainable management of ponds, as the entire pond dynamic is affected by water quality; such as pH, alkalinity, and dissolved oxygen (DO). Some of these factors fluctuate daily (such as DO and pH), weekly or monthly (such as alkalinity). In sustainably managed ponds, nighttime DO levels should not drop below 3 – 4 parts per million (ppm or mg/l). Pond pH typically fluctuates between 6.5 and 9.0. If the pH drops below 5 or rise above 10 fish kills may occur. Refer to the "Managing Farm Ponds for Fishing" by Jack Whetstone for more detailed information.

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a. Fish Population: Unmanaged ponds will generally become overcrowded with small, stunted green sunfish or bullhead catfish. It is best to start over and eliminate all of these fish. The choice of fish to be stocked (or restocked) depends on the overall goals. Largemouth bass and bluegill sunfish combinations are the most common recreational fish to be stocked. Catfish can be stocked in addition with largemouth bass or bluegill. Bluegill should be stocked first; in early autumn (September) to be sure they grow and mature enough to spawn in the spring. Largemouth bass should be stocked at 20 to 30 fish/acre in the following May or June; allowing htem to grow rapidly, feeding on young bluegill. Catfish may be stocked at 200 to 500 fish/acre in the fall or spring; be sure the catfish are as large as the largemouth bass when stocking. In ponds less than ½ acre in size, largemouth bass-bluegill populations can be difficult to manage and should be stocked with additional fish, such as blue catfish, redear sunfish, hybrid bluegill, threadfin shad, golden shiners, and fathead minnows. You should not stock crappie, gizzard shad, bullhead catfish and flathead catfish; these species rapidly overcrowd ponds and may reduce other populations. Redear sunfish can be stocked 20 – 25% redear in place bluegill. Ponds should not be fished for one year following stocking. To maintain good, consistent fishing, you must carefully control how man pounds fish are removed each year. Fertile ponds can sustain an annual harvest of 25 – 35 lbs of bass/acre; infertile ponds should not have more than 10 – 15 lbs of bass/acre removed. Bluegill should be harvested ~ 10 – 15 bluegill per a pound of bass. Populations should be checked every 1 – 2 years to ensure that fish populations are still in balance. Contact your local district fisheries biologist with the GADNR for assistance.

b. Fish Enhancement Techniques: To enhance current pond populations the following can be done: 1) adding fish shelters/habitat, 2) supplemental feeding, 3) checking and adjusting water levels, and 4) aeration. Artificial reefs or fish shelters help young fish escape predation. Old Christmas trees, eastern red cedar trees, and brush can be used as “natural” shelters. Other shelter options include creating a stake bed by driving stakes into the bottom of a pond, and rock and tire piles. All structures should not be placed any deeper than 2 – 6 feet below water. Do not place more than 3 structures per acre. For supplemental feeding, be sure to offer the feed in the same area and at the same time each day. Do not overfeed fish; supply what will be eaten in ~10 – 15 minutes. Do not feed fish more than 15 lbs of feed per acre per day. Feeding should be done from April through October. Winter feeding is not required, although can improve bluegill growth and reproduction. If feeding is continued through winter months, be sure to supply feed that sinks to the bottom of the pond and provide no more than 3 lbs of feed per acre per day. Adjusting water levels with a drain can enhance fish populations and control aquatic vegetation. In relatively deep ponds, water can be drained 2 – 3 feet in late fall and maintained throughout winter. This helps control aquatic vegetation as a result of freezing and drying on areas of exposed pond bottom. Lowered water levels also concentrate fish, increasing forage opportunities to bass. Ponds should be refilled during March and April.

c. Fertilization: To increase fish yields, ponds should be fertilized to provide phytoplankton with adequate nutrients for growth, increasing food availability throughout the food chain, and consequently increasing total amount of fish capacity the pond is able to support. Well-managed, fertile ponds can support 300 – 600 lbs/fish/acre. Liming must be done before any fertilization is added to a pond. The amount of lime needed before fertilization depends on chemical characteristics of bottom sediments (mud). A soil sample should be taken from the bottom of the pond and analyzed to determine amount of lime required. Do not fertilize ponds earlier than March 21, or before water temperatures have reached a minimum of 60˚F. Within 2 weeks of fertilizing, phytoplankton blooms should be stimulated. Do not fertilize ponds with an aquatic vegetation problem, as fertilization will only increase vegetation growth.

Aquatic Vegetation Control: Aquatic vegetation control can be performed utilizing physical, chemical or biological means. Physical control can be done by hand removal. Chemical control must be done using herbicides approved for aquatic use, and the weeds to be controlled must be accurately identified. Oxygen depletion can occur after applying herbicides. Check with the extension office, fisheries biologist, or an aquaculture specialist for proper plant identification and treatment recommendations. Biological controls, stocking of grass carp ("white amur") are often the simplest and most economical long term methods to control rooted vegetation in new/recently treated ponds. Grass carp do not stir up mud or disturb nests of other fish, and during warmer months can eat up to 30 – 40% of their body weight in vegetation daily. The number of required triploid grass carp needed for effective vegetation control depends on the type of vegetation present and intensity of the problem. If largemouth bass is already present, grass carp must be 8 inches or longer before being stocked, as the largemouth bass will eat carp fingerlings.

Roads

Roads: Maintain access roads by mowing and/or resurfacing as needed. Any areas that exhibit signs of erosion should be rehabbed and stabilized. Water diversions devices, turnouts, or ditches, should be used to improve road structure and stability. For new road construction be sure to follow guidelines as outlined in the Georgia BMP manual and consult with local resource professionals such as GFC and the NRCS. Actively manage interior road edges and maintain 15-20 foot strip(s) on one or both sides in early successional habitat. Early successional vegetation strips along roads provide added wildlife benefits (increased edge) and aides in road day-lighting (faster dry times in wet periods which minimizes rutting potential). Early successional vegetation can be managed by using light disking techniques during the winter months, mechanical mowing, or herbicide applications (as outlined in the General Wildlife and Timber Recommendation section).

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Aesthetics

Aesthetics: Prescribed burning, maintaining a quality road system, and removing debris will enhance the visual quality of this area. Consider the establishment of native tree and shrub species (Chickasaw Plum, Rhododendron, Flowering Dogwood, Redbud, Mulberry, etc.) along forest edges, openings, or roads to further improve aesthetics.